

Claims

What is claimed is:

1. An electronic musical instrument control system comprising:
 - 2 a keyboard comprising a plurality of keys, wherein each key of said plurality of keys is physically displaceable within a key travel range;
 - 4 a separate key position sensor associated with each key of said plurality of keys, wherein each key position sensor of said plurality of key position sensors responsively provides a key displacement signal corresponding to the position of an associated key within said key travel range; and
 - 8 at least one displacement sensor interface for receiving said key displacement signals from at least one of said plurality of key position sensors, wherein said at least one displacement sensor interface responsively generates an individual output control signal for each key displacement signal received at said at least one displacement sensor, and wherein each output control signal generated by said at least one displacement sensor is adapted to provide control of sounds generated by an electronic musical system.
2. The control system according to claim 1, wherein an output control signal
 - 2 associated with at least one key of said plurality of keys is adapted to provide volume control of a synthesized sound generated by said electronic musical system, wherein said volume control is
 - 4 obtained by varying the location of said at least one key within said key travel range.
3. The control system according to claim 1, wherein an output control signal
 - 2 associated with at least one key of said plurality of keys is adapted to provide timbre control of a synthesized sound generated by said electronic musical system, wherein said timbre control is
 - 4 obtained by varying the location of said at least one key within said key travel range.

4. The control system according to claim 1, said control system further comprising:
2 a separate surface sensor associated with each key of said plurality of keys, wherein each
surface sensor of said plurality of surface sensors responsively generates multi-parameter sensor
4 signals corresponding to user contact of an associated key of said plurality of keys; and
at least one surface sensor interface for receiving said multi-parameter sensor signals
6 from at least one surface sensor of said plurality of surface sensors, wherein said at least one
surface sensor interface responsively generates a multi-parameter surface sensor output control
8 signal for each multi-parameter sensor signal received at said at least one surface sensor
interface, and wherein each multi-parameter surface sensor output control signal generated by
10 said at least one surface sensor interface is adapted to further provide control of sounds generated
by said electronic musical system.

5. The control system according to claim 4, said control system further comprising:
2 a signal processor coupled to said at least one displacement sensor interface and said at
least one surface sensor interface, wherein said signal processor responsively generates an
4 outgoing unified control signal based upon individual or selected combinations of output control
signals generated by said at least one displacement sensor interface and said at least one surface
6 sensor interface.

6. The control system according to claim 4, wherein each key of said plurality of
2 keys provides for the control of at least three independent, substantially continuous parameters,
wherein said at least three independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one displacement sensor interface and said at
least one surface sensor interface.

7. The control system according to claim 4, wherein each surface sensor associated
2 with each key of said plurality of keys comprises a pressure sensor.

8. The control system according to claim 4, wherein each surface sensor associated
2 with each key of said plurality of keys comprises a null contact sensor.

9. The control system according to claim 6, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control filter formants of sounds generated by said electronic musical system.

10. The control system according to claim 9, wherein said filter formants are used to
2 control vowel synthesis of sounds generated by said electronic musical system.

11. The control system according to claim 6, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control sounds generated by said electronic musical system, wherein said sounds are generated
4 using a timbre-space model.

12. The control system according to claim 11, wherein said timbre-space model is
2 accomplished using volume cross-fading.

13. The control system according to claim 11, wherein said timbre-space model is
2 accomplished using morphable numerical instrument models.

14. The control system according to claim 7, wherein each key of said plurality of
2 keys provides for the control of at least four independent, substantially continuous parameters,
wherein said at least four independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one displacement sensor interface and said at
least one surface sensor interface.

15. The control system according to claim 4, wherein each surface sensor associated
2 with each key of said plurality of keys includes a pressure sensor formed with sensor mini-array
chips.

16. The control system according to claim 4, wherein each key of said plurality of
2 keys provides per-key modulation control of long-duration notes using output control signals
generated by said at least one displacement sensor interface and said at least one surface sensor
4 interface.

17. The control system according to claim 1, wherein one or more pre-determined
2 values of said key displacement signal associated with at least one key of said plurality of keys
trigger the generation of particular synthesizer sounds by said electronic musical system.

18. The control system according to claim 1, said control system further comprising:
2 a control signal generator for generating a physical restoring force signal for each key of
said plurality of keys, wherein each physical restoring force signal of said plurality of physical
4 restoring force signals is generated based upon a corresponding key displacement signal
generated in response to the position of an associated key within said key travel range, wherein
6 said physical restoring force signal identifies an amount of necessary force to provide a desired
level of tactile feedback for said associated key; and
8 a restoring force actuator coupled to each key of said plurality of keys, wherein said
restoring force actuator responsively provides said desired level of tactile feedback in response to
10 an associated physical restoring force signal generated by said control signal generator.

19. The control system according to claim 1, wherein each output control signal of
2 said plurality of individual output control signals comprise signals of MIDI format.

20. A method for controlling an electronic musical instrument, said method

comprising:

providing a keyboard comprising a plurality of keys, wherein each key of said plurality of keys is physically displaceable within a key travel range;

associating a separate key position sensor with each key of said plurality of keys, wherein each key position sensor of said plurality of key position sensors responsively provides a key displacement signal corresponding to the position of an associated key within said key travel range; and

receiving said key displacement signals from at least one of said plurality of key position sensors using at least one displacement sensor interface, wherein said at least one displacement sensor interface responsively generates an individual output control signal for each key displacement signal received at said at least one displacement sensor, and wherein each output control signal generated by said at least one displacement sensor is adapted to provide control of sounds generated by an electronic musical system.

21. The method according to claim 20, wherein an output control signal associated with at least one key of said plurality of keys is adapted to provide volume control of a synthesized sound generated by said electronic musical system, wherein said volume control is obtained by varying the location of said at least one key within said key travel range.

22. The method according to claim 20, wherein an output control signal associated with at least one key of said plurality of keys is adapted to provide timbre control of a synthesized sound generated by said electronic musical system, wherein said timbre control is obtained by varying the location of said at least one key within said key travel range.

23. The method according to claim 20, said method further comprising:

2 associating a separate surface sensor with each key of said plurality of keys, wherein each
surface sensor of said plurality of surface sensors responsively generates multi-parameter sensor
4 signals corresponding to user contact of an associated key of said plurality of keys; and
receiving said multi-parameter sensor signals from at least one surface sensor of said
6 plurality of surface sensors using at least one surface sensor interface, wherein said at least one
surface sensor interface responsively generates a multi-parameter surface sensor output control
8 signal for each multi-parameter sensor signal received at said at least one surface sensor
interface, and wherein each multi-parameter surface sensor output control signal generated by
10 said at least one surface sensor interface is adapted to further provide control of sounds generated
by said electronic musical system.

24. The method according to claim 23, said method further comprising:

2 coupling a signal processor to said at least one displacement sensor interface and said at
least one surface sensor interface, wherein said signal processor responsively generates an
4 outgoing unified control signal based upon individual or selected combinations of output control
signals generated by said at least one displacement sensor interface and said at least one surface
6 sensor interface.

25. The method according to claim 23, wherein each key of said plurality of keys

2 provides for the control of at least three independent, substantially continuous parameters,
wherein said at least three independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one displacement sensor interface and said at
least one surface sensor interface.

26. The method according to claim 23, wherein each surface sensor associated with

2 each key of said plurality of keys comprises a pressure sensor.

27. The method according to claim 23, wherein each surface sensor associated with

2 each key of said plurality of keys comprises a null contact sensor.

28. The method according to claim 25, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control filter formants of sounds generated by said electronic musical system.

29. The method according to claim 28, wherein said filter formants are used to control
2 vowel synthesis of sounds generated by said electronic musical system.

30. The method according to claim 25, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control sounds generated by said electronic musical system, wherein said sounds are generated
4 using a timbre-space model.

31. The method according to claim 30, wherein said timbre-space model is
2 accomplished using volume cross-fading.

32. The method according to claim 30, wherein said timbre-space model is
2 accomplished using morphable numerical instrument models.

33. The method according to claim 26, wherein each key of said plurality of keys
2 provides for the control of at least four independent, substantially continuous parameters,
wherein said at least four independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one displacement sensor interface and said at
least one surface sensor interface.

34. The method according to claim 23, wherein each surface sensor associated with
2 each key of said plurality of keys includes a pressure sensor formed with sensor mini-array chips.

35. The method according to claim 23, wherein each key of said plurality of keys
2 provides per-key modulation control of long-duration notes using output control signals
generated by said at least one displacement sensor interface and said at least one surface sensor
4 interface.

36. The method according to claim 20, wherein one or more pre-determined values of
2 said key displacement signal associated with at least one key of said plurality of keys trigger the
generation of particular synthesizer sounds by said electronic musical system.

37. The method according to claim 20, said method further comprising:
2 generating a physical restoring force signal for each key of said plurality of keys using a
control signal generator, wherein each physical restoring force signal of said plurality of physical
4 restoring force signals is generated based upon a corresponding key displacement signal
generated in response to the position of an associated key within said key travel range, wherein
6 said physical restoring force signal identifies an amount of necessary force to provide a desired
level of tactile feedback for said associated key; and
8 coupling a restoring force actuator to each key of said plurality of keys, wherein said
restoring force actuator responsively provides said desired level of tactile feedback in response to
10 an associated physical restoring force signal generated by said control signal generator.

38. The method according to claim 20, wherein each output control signal of said
2 plurality of individual output control signals comprise signals of MIDI format.

39. An electronic musical control system comprising:

a musical keyboard comprising a plurality of keys;

a separate surface sensor associated with each key of said plurality of keys, wherein each

surface sensor of said plurality of surface sensors responsively generates multi-parameter sensor signals corresponding to user contact of an associated key of said plurality of keys; and

at least one surface sensor interface for receiving said multi-parameter sensor signals

from at least one surface sensor of said plurality of surface sensors, wherein said at least one

surface sensor interface responsively generates a multi-parameter surface sensor output control signal for each multi-parameter sensor signal received at said at least one surface sensor

interface, and wherein each multi-parameter surface sensor output control signal generated by

said at least one surface sensor is adapted to provide control of sound generated by an electronic

musical system.

40. The control system according to claim 39, wherein an output control signal

associated with at least one key of said plurality of keys is adapted to provide volume control of a synthesized sound generated by said electronic musical system.

41. The control system according to claim 39, wherein an output control signal

associated with at least one key of said plurality of keys is adapted to provide timbre control of a synthesized sound generated by said electronic musical system.

42. The control system according to claim 39, said control system further comprising:

a key switch associated with each key of said plurality of keys, wherein each key switch of said plurality of key switches responsively provides a key switch signal whenever an

associated key experiences a threshold level of user contact; and

at least one key switch interface for receiving said key switch signals from said plurality

of key switches, wherein said at least one key switch interface responsively generates an

individual output control signal for each of said plurality of said key switch signals, and wherein

each output control signal of said plurality of individual output control signals is adapted to

provide control of sounds generated by said electronic musical system.

43. The control system according to claim 39, wherein each key of said plurality of
2 keys provides for the control of at least three independent, substantially continuous parameters,
wherein said at least three independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one surface sensor interface.

44. The control system according to claim 39, wherein each surface sensor associated
2 with each key of said plurality of keys comprises a pressure sensor.

45. The control system according to claim 39, wherein each surface sensor associated
2 with each key of said plurality of keys comprises a null contact sensor.

46. The control system according to claim 43, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control filter formants of sounds generated by said electronic musical system.

47. The control system according to claim 46, wherein said filter formants are used to
2 control vowel synthesis of sounds generated by said electronic musical system.

48. The control system according to claim 43, wherein said at least three independent,
2 substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control sounds generated by said electronic musical system, wherein said sounds are generated
4 using a timbre-space model.

49. The control system according to claim 48, wherein said timbre-space model is
2 accomplished using volume cross-fading.

50. The control system according to claim 48, wherein said timbre-space model is
2 accomplished using morphable numerical instrument models.

51. The control system according to claim 44, wherein each key of said plurality of
2 keys provides for the control of at least four independent, substantially continuous parameters,
wherein said at least four independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one surface sensor interface.

52. The control system according to claim 39, wherein each surface sensor associated
2 with each key of said plurality of keys includes a pressure sensor formed with sensor mini-array
chips.

53. The control system according to claim 39, wherein each key of said plurality of
2 keys provides per-key modulation control of long-duration notes using output control signals
generated by said at least one surface sensor interface.

54. The control system according to claim 39, wherein each output control signal of
2 said plurality of individual output control signals comprise signals of MIDI format.

55. A method for controlling an electronic musical control system, said method
2 comprising:

providing a musical keyboard comprising a plurality of keys;

4 associating a separate surface sensor with each key of said plurality of keys, wherein each
surface sensor of said plurality of surface sensors responsively generates multi-parameter sensor
6 signals corresponding to user contact of an associated key of said plurality of keys; and

receiving said multi-parameter sensor signals from at least one surface sensor of said
8 plurality of surface sensors using at least one surface sensor interface, wherein said at least one
surface sensor interface responsively generates a multi-parameter surface sensor output control
10 signal for each multi-parameter sensor signal received at said at least one surface sensor
interface, and wherein each multi-parameter surface sensor output control signal generated by
12 said at least one surface sensor is adapted to provide control of sound generated by an electronic
musical system.

2 56. The method according to claim 55, wherein an output control signal associated
with at least one key of said plurality of keys is adapted to provide volume control of a
synthesized sound generated by said electronic musical system.

2 57. The method according to claim 55, wherein an output control signal associated
with at least one key of said plurality of keys is adapted to provide timbre control of a
synthesized sound generated by said electronic musical system.

2 58. The method according to claim 55, said method further comprising:
associating a key switch with each key of said plurality of keys, wherein each key switch
of said plurality of key switches responsively provides a key switch signal whenever an
4 associated key experiences a threshold level of user contact; and
receiving said key switch signals from said plurality of key switches using at least one
6 key switch interface, wherein said at least one key switch interface responsively generates an
individual output control signal for each of said plurality of said key switch signals, and wherein
8 each output control signal of said plurality of individual output control signals is adapted to
provide control of sounds generated by said electronic musical system.

2 59. The method according to claim 55, wherein each key of said plurality of keys
provides for the control of at least three independent, substantially continuous parameters,
wherein said at least three independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one surface sensor interface.

2 60. The method according to claim 55, wherein each surface sensor associated with
each key of said plurality of keys comprises a pressure sensor.

2 61. The method according to claim 55, wherein each surface sensor associated with
each key of said plurality of keys comprises a null contact sensor.

2 62. The method according to claim 59, wherein said at least three independent,
substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control filter formants of sounds generated by said electronic musical system.

2 63. The method according to claim 62, wherein said filter formants are used to control
vowel synthesis of sounds generated by said electronic musical system.

2 64. The method according to claim 59, wherein said at least three independent,
substantially continuous parameters, for at least one key of said plurality of keys, are adapted to
control sounds generated by said electronic musical system, wherein said sounds are generated
4 using a timbre-space model.

2 65. The method according to claim 64, wherein said timbre-space model is
accomplished using volume cross-fading.

2 66. The method according to claim 64, wherein said timbre-space model is
accomplished using morphable numerical instrument models.

2 67. The method according to claim 60, wherein each key of said plurality of keys
provides for the control of at least four independent, substantially continuous parameters,
wherein said at least four independent, substantially continuous parameters are controlled using
4 output control signals generated by said at least one surface sensor interface.

2 68. The method according to claim 55, wherein each surface sensor associated with
each key of said plurality of keys includes a pressure sensor formed with sensor mini-array chips

2 69. The method according to claim 55, wherein each key of said plurality of keys
provides per-key modulation control of long-duration notes using output control signals
generated by said at least one surface sensor interface.

70. The method according to claim 55, wherein one or more pre-determined values of said key displacement signal associated with at least one key of said plurality of keys trigger the generation of particular synthesizer sounds by said electronic musical system.

71. The method according to claim 55, wherein each output control signal of said plurality of individual output control signals comprise signals of MIDI format.

72. An electronic musical instrument control system comprising:
a musical keyboard comprising a plurality of keys, said musical keyboard configured to cooperatively operate with a non-keyboard musical instrument comprising a body and a music creating area, wherein said musical keyboard is attachable to said body of said non-keyboard musical instrument in a location that is sufficiently adjacent to said music creating area to facilitate simultaneous operation of said musical keyboard and said non-keyboard musical instrument;
a key switch associated with each key of said plurality of keys, wherein each key switch of said plurality of key switches responsively provides a key switch signal whenever an associated key experiences a threshold level of user contact; and
a processor for receiving said key switch signals from said plurality of key switches, wherein said processor responsively generates an individual output control signal for each of said plurality of said key switch signals, and wherein each output control signal of said plurality of individual output control signals is adapted to provide control of sounds generated by an electronic musical system.

73. The control system according to claim 72, wherein said musical keyboard is integrated with said body of said non-keyboard instrument.

74. The control system according to claim 72, wherein said musical keyboard is removably attachable to said body of said non-keyboard instrument.

75. The control system according to claim 72, wherein said non-keyboard instrument
2 comprises a stringed guitar, and wherein said music creating area comprises a string strumming
or string picking area.

76. The control system according to claim 72, said control system further comprising:
2 a plurality of said musical keyboards proximately arranged relative to each other, wherein
each musical keyboard of said plurality of musical keyboards are attachable to said body of said
4 non-keyboard musical instrument and in a location that is sufficiently adjacent to said music
creating area to facilitate simultaneous operation of any single musical keyboard of said plurality
6 of musical keyboards and said non-keyboard musical instrument.

77. The control system according to claim 76, wherein each musical keyboard of said
2 plurality of musical keyboards are attachable to said body of said non-keyboard musical
instrument and in a location that is sufficiently adjacent to said music creating area to facilitate
4 simultaneous operation of each musical keyboard of said plurality of musical keyboards and said
non-keyboard musical instrument.

78. The control system according to claim 72, wherein each output control signal of
2 said plurality of individual output control signals comprise signals of MIDI format.

79. A method for controlling an electronic musical instrument, said method

comprising:

providing a musical keyboard comprising a plurality of keys, said musical keyboard configured to cooperatively operate with a non-keyboard musical instrument comprising a body and a music creating area, wherein said musical keyboard is attachable to said body of said non-keyboard musical instrument in a location that is sufficiently adjacent to said music creating area to facilitate simultaneous operation of said musical keyboard and said non-keyboard musical instrument;

associating a key switch with each key of said plurality of keys, wherein each key switch of said plurality of key switches responsively provides a key switch signal whenever an associated key experiences a threshold level of user contact; and

receiving said key switch signals from said plurality of key switches using a processor, wherein said processor responsively generates an individual output control signal for each of said plurality of said key switch signals, and wherein each output control signal of said plurality of individual output control signals is adapted to provide control of sounds generated by an electronic musical system.

80. The method according to claim 79, wherein said musical keyboard is integrated with said body of said non-keyboard instrument.

81. The method according to claim 79, wherein said musical keyboard is removably attachable to said body of said non-keyboard instrument.

82. The method according to claim 79, wherein said non-keyboard instrument comprises a stringed guitar, and wherein said music creating area comprises a string strumming or string picking area.

83. The method according to claim 79, said method further comprising:
2 proximately arranging a plurality of said musical keyboards relative to each other,
wherein each musical keyboard of said plurality of musical keyboards are attachable to said body
4 of said non-keyboard musical instrument and in a location that is sufficiently adjacent to said
music creating area to facilitate simultaneous operation of any single musical keyboard of said
6 plurality of musical keyboards and said non-keyboard musical instrument.

84. The method according to claim 83, wherein each musical keyboard of said
2 plurality of musical keyboards are attachable to said body of said non-keyboard musical
instrument and in a location that is sufficiently adjacent to said music creating area to facilitate
4 simultaneous operation of each musical keyboard of said plurality of musical keyboards and said
non-keyboard musical instrument.

85. The method according to claim 79, wherein each output control signal of said
2 plurality of individual output control signals comprise signals of MIDI format.

86. An electronic musical instrument control system comprising:

a first musical keyboard comprising a plurality of keys;

a second musical keyboard comprising a plurality of keys;

a fastener proximately locating said second musical keyboard over said first musical keyboard to define a horizontal and vertical offset between said first and second musical keyboards, and wherein said horizontal and vertical offset permits fingers of the same hand of a user to simultaneously operate said first and second musical keyboards;

a key switch associated with each key of said plurality of keys, for said first and second musical keyboards, wherein each key switch of said plurality of key switches responsively provides a key switch signal whenever an associated key experiences a threshold level of user contact; and

at least one key switch interface for receiving said key switch signals from said plurality of key switches, wherein said at least one key switch interface responsively generates an individual output control signal for each of said plurality of said key switch signals, and wherein each output control signal of said plurality of individual output control signals is adapted to provide control of sounds generated by an electronic musical system.

87. The control system according to claim 86, said control system further comprising:

a third musical keyboard comprising a plurality of keys, wherein said fastener proximately locates said third musical keyboard over said second musical keyboard to define a horizontal and vertical offset between said third and second musical keyboards, and wherein said horizontal and vertical offset between said third and second musical keyboards permits fingers of the same hand of a user to simultaneous operate said first, second and third musical keyboards, and wherein

said key switch is associated with each key of said plurality of keys of said first, second and third musical keyboards, wherein each key switch of said plurality of key switches responsively provides a key switch signal whenever an associated key experiences a threshold level of user contact.

2 88. The control system according to claim 86, wherein said key switch signals from
said plurality of key switches are obtained using scanning electronics shared across said first and
second musical keyboards.

2 89. The control system according to claim 86, said control system further comprising:
a separate surface sensor associated with each key of said plurality of keys, for said first
and second musical keyboards, wherein each surface sensor of said plurality of surface sensors
4 responsively generates multi-parameter sensor signals corresponding to user contact of an
associated key of said plurality of keys; and
6 at least one surface sensor interface for receiving said multi-parameter sensor signals
from at least one surface sensor of said plurality of surface sensors, wherein said at least one
8 surface sensor interface responsively generates a multi-parameter surface sensor output control
signal for each multi-parameter sensor signal received at said at least one surface sensor
10 interface, and wherein each multi-parameter surface sensor output control signal generated by
said at least one surface sensor interface is adapted to provide further control of sound generated
12 by said electronic musical system.

2 90. The control system according to claim 89, wherein each surface sensor associated
with each key of said plurality of keys, for at least one musical keyboard of said first and second
musical keyboards, comprises a pressure sensor.

2 91. The control system according to claim 89, wherein each surface sensor associated
with each key of said plurality of keys, for said first and second musical keyboards, comprises a
null contact sensor.

2 92. The control system according to claim 86, wherein each output control signal of
said plurality of individual output control signals comprise signals of MIDI format.

93. The control system according to claim 86, wherein each key of said plurality of
2 keys, for said first and second musical keyboards, is physically displaceable within a key travel
range, said control system further comprising:
4 a separate key position sensor associated with each key of said plurality of keys, for at
least one of said first and second musical keyboards, wherein each key position sensor of said
6 plurality of key position sensors responsively provides a key displacement signal corresponding
to the position of an associated key within said key travel range; and
8 at least one displacement sensor interface for receiving said key displacement signals
from at least one of said plurality of key position sensors, wherein said at least one displacement
10 sensor interface responsively generates an individual output control signal for each key
displacement signal received at said at least one displacement sensor interface, and wherein each
12 output control signal generated by said at least one displacement sensor interface is adapted to
provide further control of sounds generated by said electronic musical system.

94. A method for controlling an electronic musical instrument, said method
2 comprising:
providing a first musical keyboard comprising a plurality of keys;
4 providing a second musical keyboard comprising a plurality of keys;
proximately locating said second musical keyboard over said first musical keyboard to
6 define a horizontal and vertical offset between said first and second musical keyboards, and
wherein said horizontal and vertical offset permits fingers of the same hand of a user to
8 simultaneously operate said first and second musical keyboards;
associating a key switch with each key of said plurality of keys, for said first and second
10 musical keyboards, wherein each key switch of said plurality of key switches responsively
provides a key switch signal whenever an associated key experiences a threshold level of user
12 contact; and
receiving said key switch signals from said plurality of key switches using at least one
14 key switch interface, wherein said at least one key switch interface responsively generates an
individual output control signal for each of said plurality of said key switch signals, and wherein
16 each output control signal of said plurality of individual output control signals is adapted to
provide control of sounds generated by an electronic musical system.

95. The method according to claim 94, said method further comprising:
2 providing a third musical keyboard comprising a plurality of keys;
proximately locating said third musical keyboard over said second musical keyboard to
4 define a horizontal and vertical offset between said third and second musical keyboards, and
wherein said horizontal and vertical offset between said third and second musical keyboards
6 permits fingers of the same hand of a user to simultaneous operate said first, second and third
musical keyboards; and
8 associating said key switch with each key of said plurality of keys of said first, second
and third musical keyboards, wherein each key switch of said plurality of key switches
10 responsively provides a key switch signal whenever an associated key experiences a threshold
level of user contact.

2 96. The method according to claim 94, wherein said key switch signals from said
plurality of key switches are obtained using scanning electronics shared across said first and
second musical keyboards.

2 97. The method according to claim 94, said method further comprising:
associating a separate surface sensor with each key of said plurality of keys, for at least
4 one of said first and second musical keyboards, wherein each surface sensor of said plurality of
surface sensors responsively generates multi-parameter sensor signals corresponding to user
contact of an associated key of said plurality of keys; and
6 receiving said multi-parameter sensor signals from at least one surface sensor of said
plurality of surface sensors at least one surface sensor interface, wherein said at least one surface
8 sensor interface responsively generates a multi-parameter surface sensor output control signal for
each multi-parameter sensor signal received at said at least one surface sensor interface, and
10 wherein each multi-parameter surface sensor output control signal generated by said at least one
surface sensor interface is adapted to provide further control of sound generated by said
12 electronic musical system.

2 98. The method according to claim 97, wherein each surface sensor associated with
each key of said plurality of keys, for at least one musical keyboard of said first and second
musical keyboards, comprises a pressure sensor.

2 99. The method according to claim 97, wherein each surface sensor associated with
each key of said plurality of keys, for said first and second musical keyboards, comprises a null
contact sensor.

2 100. The method according to claim 94, wherein each output control signal of said
plurality of individual output control signals comprise signals of MIDI format.

101. The method according to claim 94, wherein each key of said plurality of keys, for
2 said first and second musical keyboards, is physically displaceable within a key travel range, said
method further comprising:

4 associating a separate key position sensor with each key of said plurality of keys, for said
first and second musical keyboards, wherein each key position sensor of said plurality of key
6 position sensors responsively provides a key displacement signal corresponding to the position of
an associated key within said key travel range; and

8 receiving said key displacement signals from at least one of said plurality of key position
sensors using at least one displacement sensor interface, wherein said at least one displacement
10 sensor interface responsively generates an individual output control signal for each key
displacement signal received at said at least one displacement sensor interface, and wherein each
12 output control signal generated by said at least one displacement sensor interface is adapted to
provide further control of sounds generated by said electronic musical system.